COMPUTER
IMAGE
CORPORATION

ALTEMUS

MONITOR
SCANIMATE

OBS.

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COMPUTER
IMAGE
CORPORATION

2475 WEST
SECOND
AVENUE
SUITE 4
DENVER,
COLORADO
80223

X-Y CATHODE RAY TUBE MONITOR

Model 202 Monitor
Model 203 Deflection Amplifier

General Description:

The Computer Image Model 202 X-Y Monitor is a high resolution display device utilizing a precision 5 inch diameter, flat-faced cathode ray tube. Magnetic deflection and focusing are employed to obtain a spot diameter of approximately 0.001 inch (1 mil). Deflection currents are generated by the Model 203 Power Amplifier, a unit which drives the X and Y windings of the deflection yoke. The full power bandwidth is 0 - 70 KHz, enabling full screen deflection in 8 microseconds. Small signal bandwidth is 300 KHz. Dynamic correction for pincushion distortion is provided, along with regulated electromagnetic focusing. Z-axis modulation is employed for intensity control and blanking. Video bandwidth is 30 Hz - 10 MHz and dynamic intensity control proportional to image size is available. The unit contains a regulated high voltage power supply providing 20,000 volts DC for the cathode ray tube.

Model 202 Monitor

Specifications:

Video:

Input, 1 volt peak-to-peak, AC coupled;
Bandwidth, 30 Hz - 10 MHz;
Remote gain control for linear intensity adjustment, minimum gain @ 0 volts, maximum gain @ +10 volts, bandwidth DC - 100 KHz;
Input impedance, 1 megohm.

Blanking:

Input, ≥ +2.5 volts unblanks, ≤ +0.5 volts blanks;
Response time of blanking circuit, 0.5 microseconds;
Minimum repetition rate of blanking pulses, 10 KHz;
Input impedance, 4.7K ohms.

Magnetic deflection and focus;
Regulated focus current supply;
Deflection yoke, Syntronic Type C3311-HF-SPL;
Spot size, 0.001 inch (1 mil) as measured by the shrinking raster method.

Input Power Requirements:

+ 48 volts DC @ 250 Ma., regulation 1%;
± 15 volts DC @ 200 Ma., regulation 0.1%;
115 volts AC @ 44 Ma. (5 watts).

Size:

8-3/4" x 19" x 26" plus 4" for rear cables (standard 19" rack mount).

Weight:

40 lbs.

Unit Price:

$2000 for monitor unit. (Price does not include deflection amplifier, cathode ray tube or external power supplies).

Additional Option:

Intensity control proportional to image size for variable sized raster scan mode.
Unit price, $1000.

Model 203 X-Y Deflection Amplifier

Specifications:

Maximum input, ± 5 volts peak;
Small signal bandwidth, DC - 300 KHz (-3 db);
Full power bandwidth, DC - 70 KHz;
Maximum output current, ± 3.5 amps;
Transient response time, 8 microseconds (including settling time) for a 7 ampere current transition into a 30 microhenry inductive load;
Linearity, better than 1%;
Dynamic correction for pincushion distortion.

Input Power Requirements:

± 48 volts DC @ 8 amps, regulation 1%;
115 volts AC, 60 Hz @ 122 ma. (14 watts).

Size:

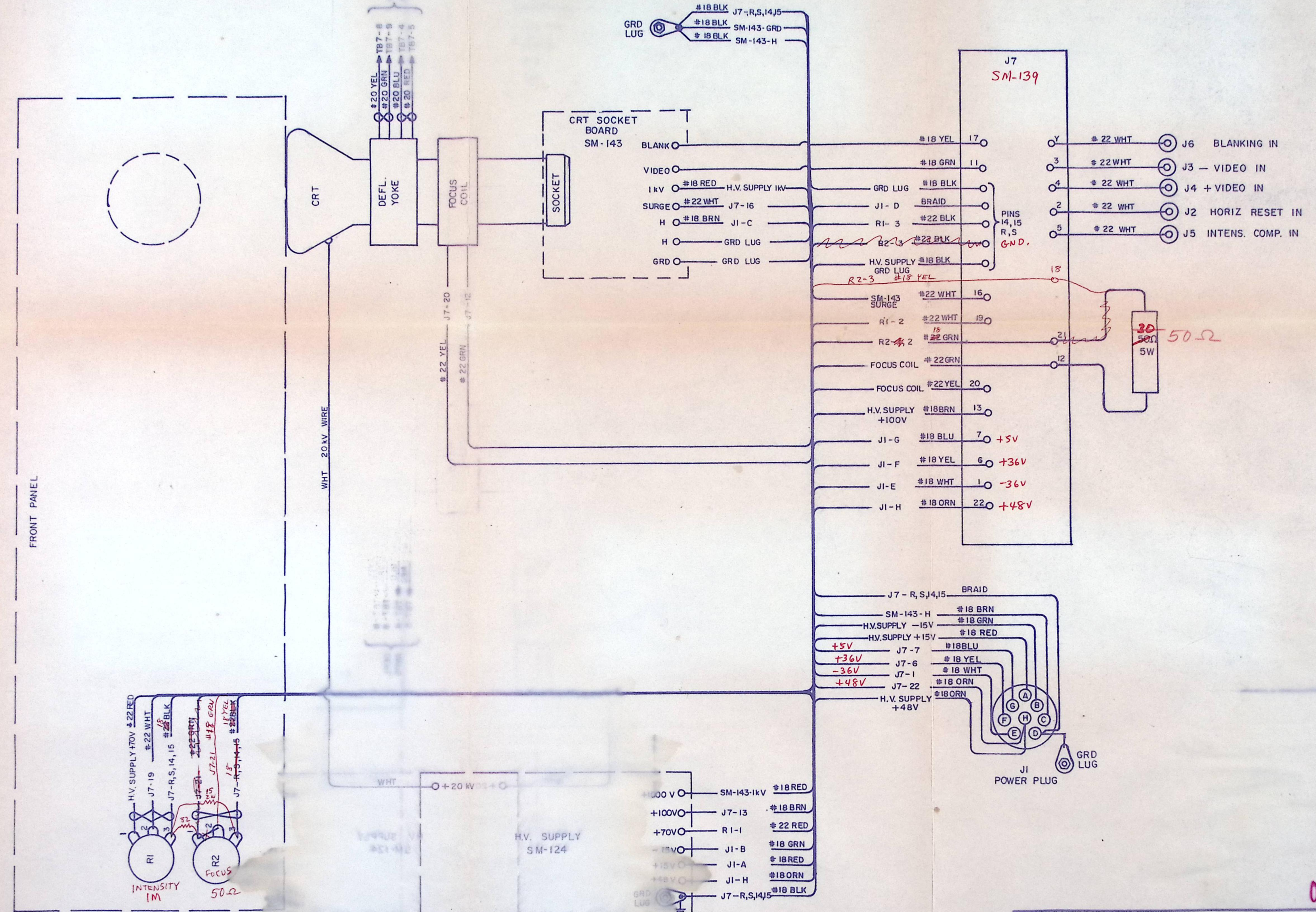
Deflection amplifier, 7-3/4" x 7-1/4" x 7-3/4";
Chassis, 8-3/4" x 19" x 12" (standard rack mount).

Weight:

16 lbs. for deflection amplifier and chassis.

Unit Price:

$3000 for one deflection amplifier unit chassis mounted. (Price does not include external power supplies).

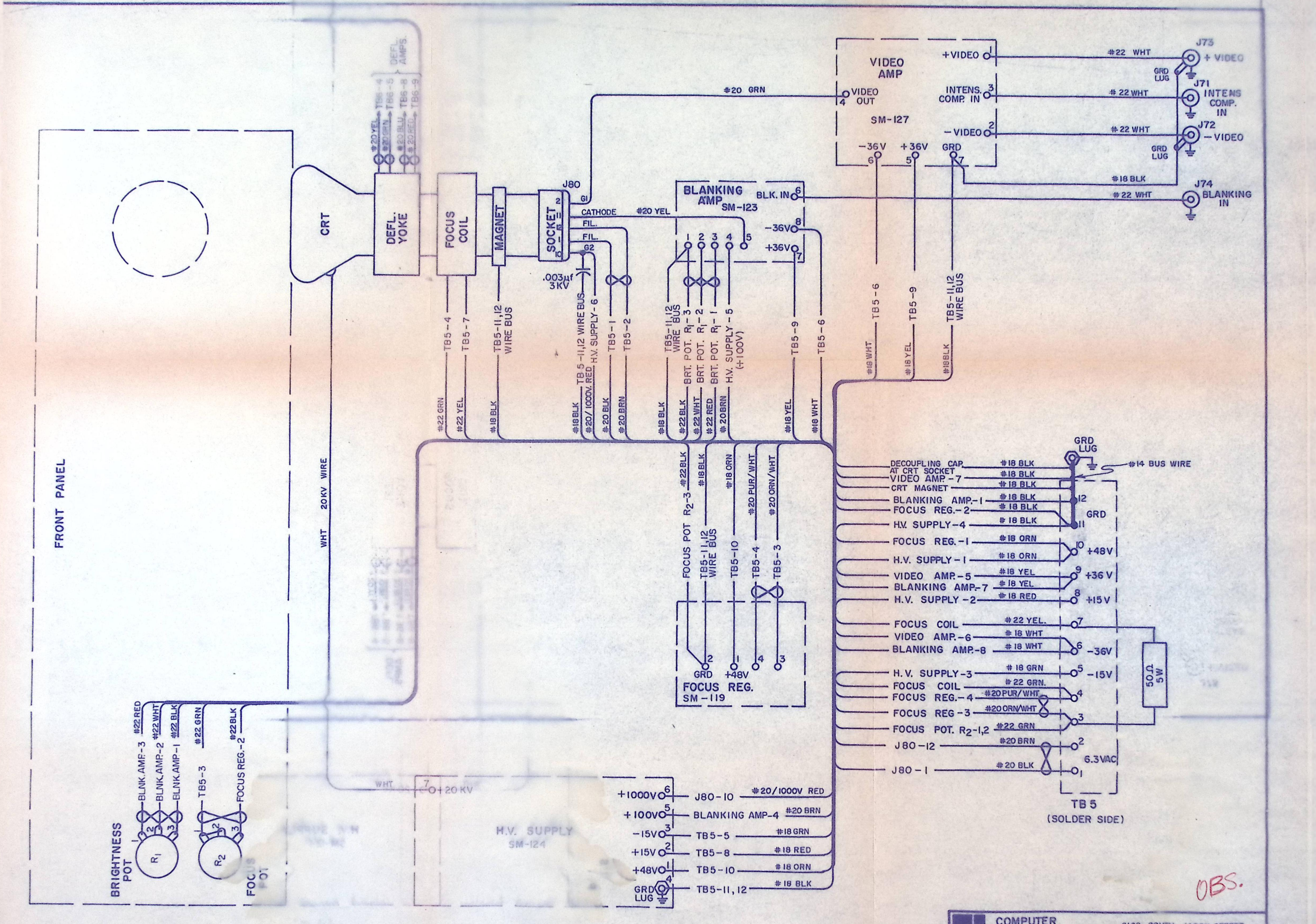


COMPUTER IMAGE CORPORATION
2475 W. 2nd. AVE.
DENVER, COLORADO 80223

SCALE NONE	REVISION	BY	DATE
DATE 11-16-72			
DR'N. E.R. / CK'D.			
AP'VD.			

TITLE MONITOR DRAWER WIRING DIAGRAM

NO. SMW-202-1



OBS.

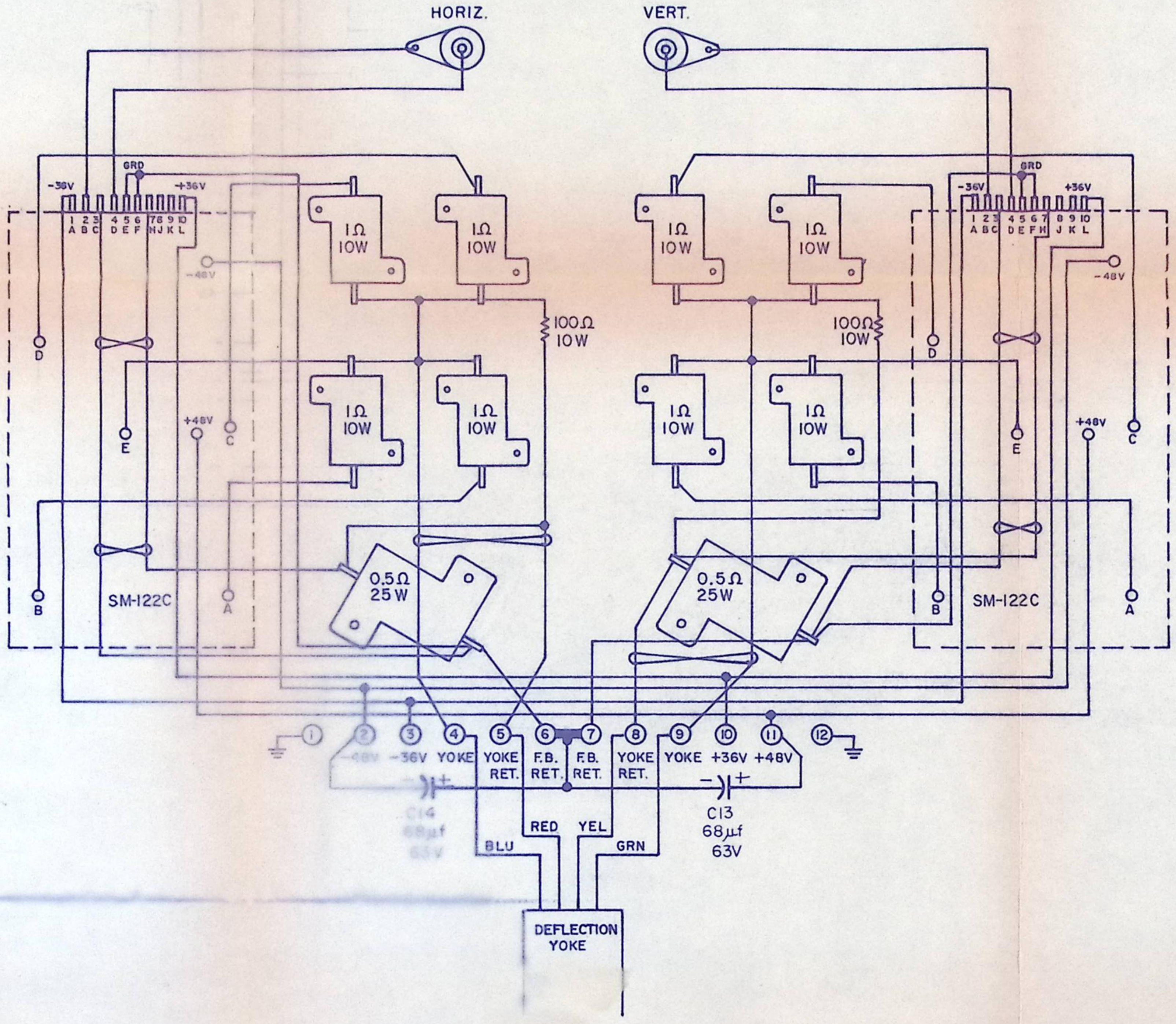
COMPUTER IMAGE CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE: NONE	REVISION	BY	DATE
DATE: 3-10-70			
DR'N E.R.	CK'D		
AP'VD.			

TITLE: MONITOR DRAWER WIRING DIAGRAM

NO. SMW-202



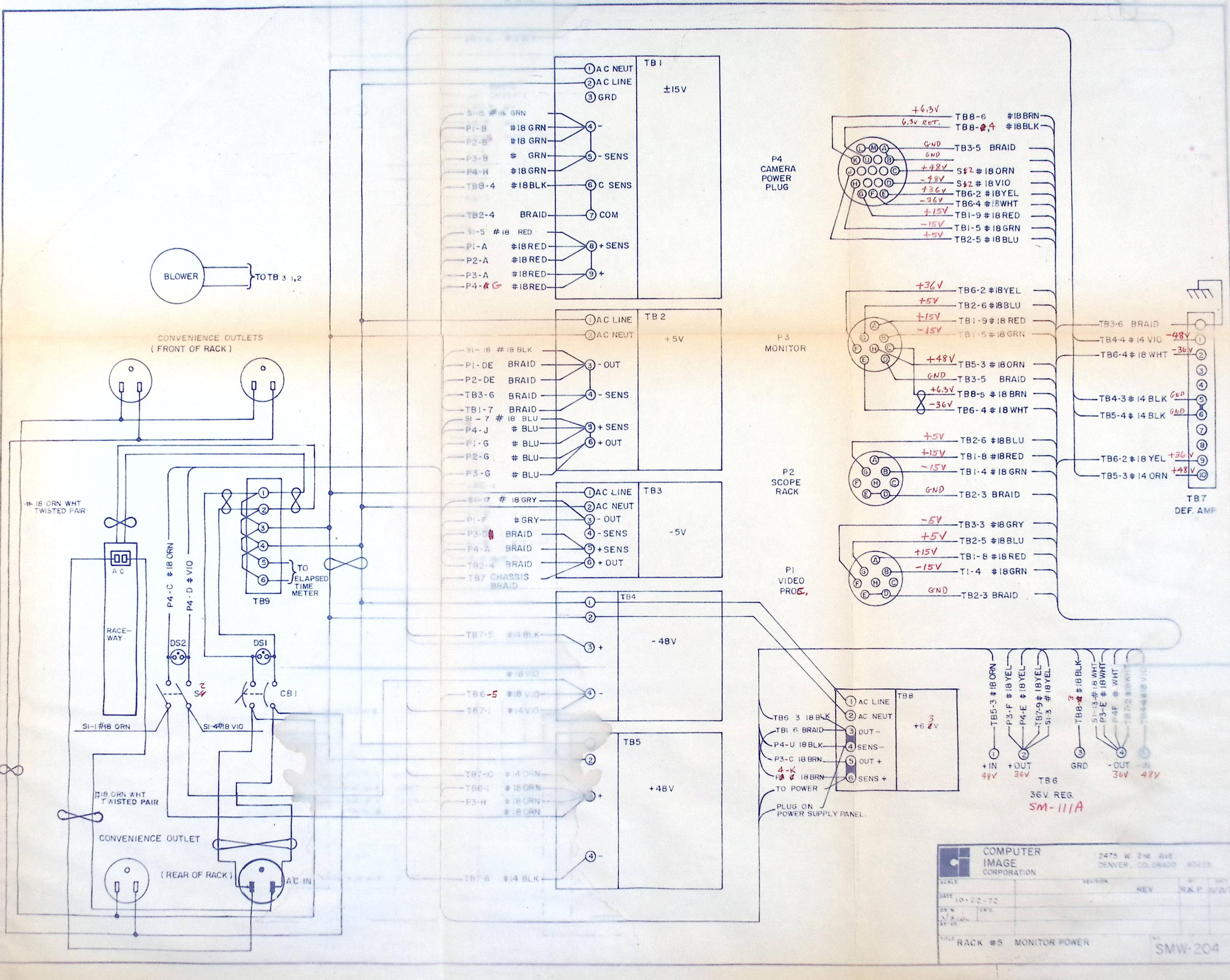
COMPUTER IMAGE CORPORATION

2475 W. 2 nd. AVE.
DENVER, COLORADO 80223.

SCALE NONE	REVISION	BY	DATE
DATE 12-14-71			
DR'N. E.R. / CK'D.			
AP'VD.			

TITLE X-Y DEFLECTION AMPLIFIER
WIRING DIAGRAM

NO. SMW-203



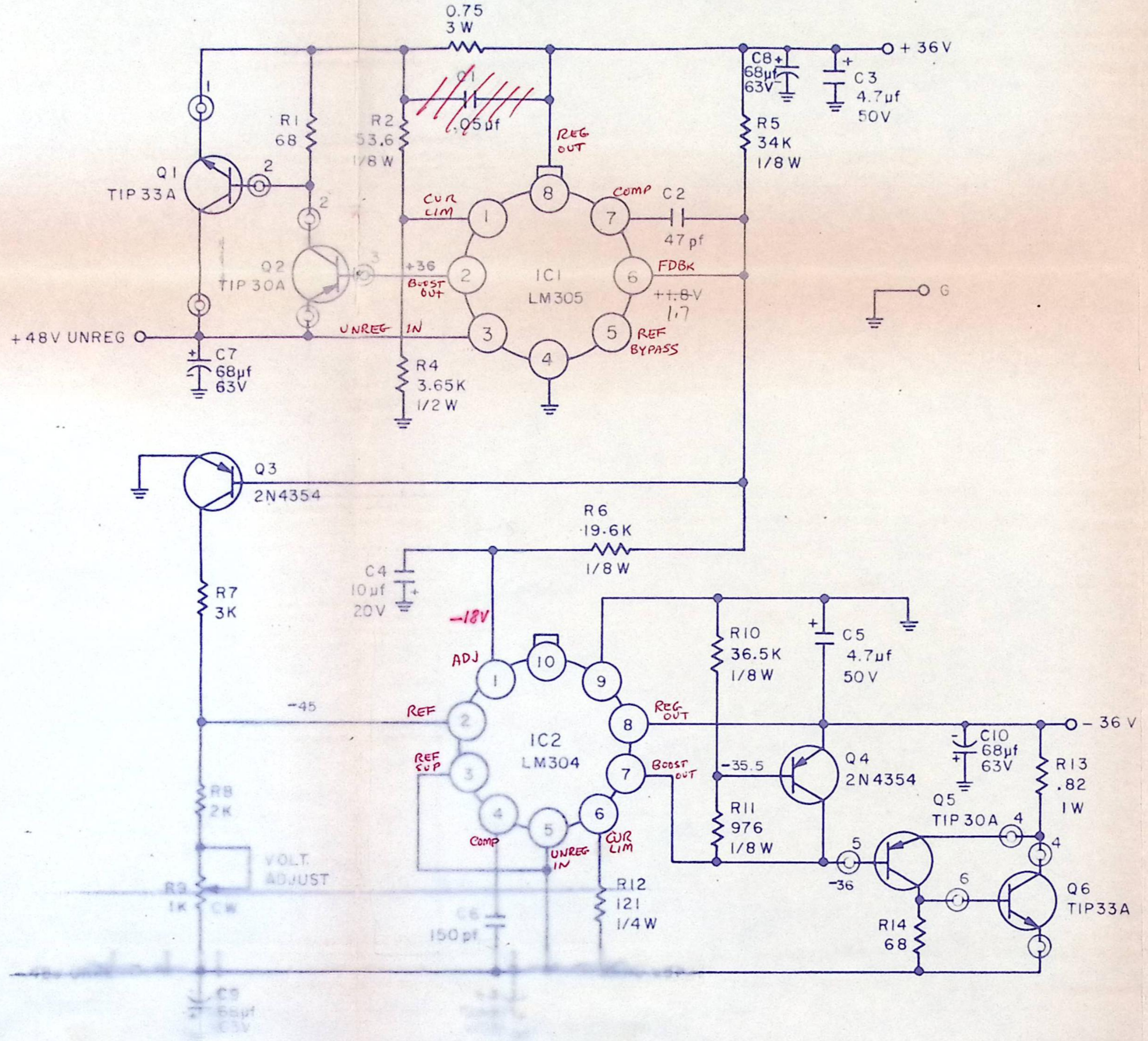
COMPUTER
IMAGE
CORPORATION

2475 W. 2nd AVE.
DENVER, COLORADO 80223

SCALE	REVISION	REV	BY R.K.P.	DATE 11/2/72
DATE 10-22-72				
DR'N	CK'D			
AP'VD.				

TITLE RACK #5 MONITOR POWER

NO. SMW-204



NOTE: Q1, Q2, Q5, Q6 MOUNTED ON DELTA NC-421K HEAT SINK.

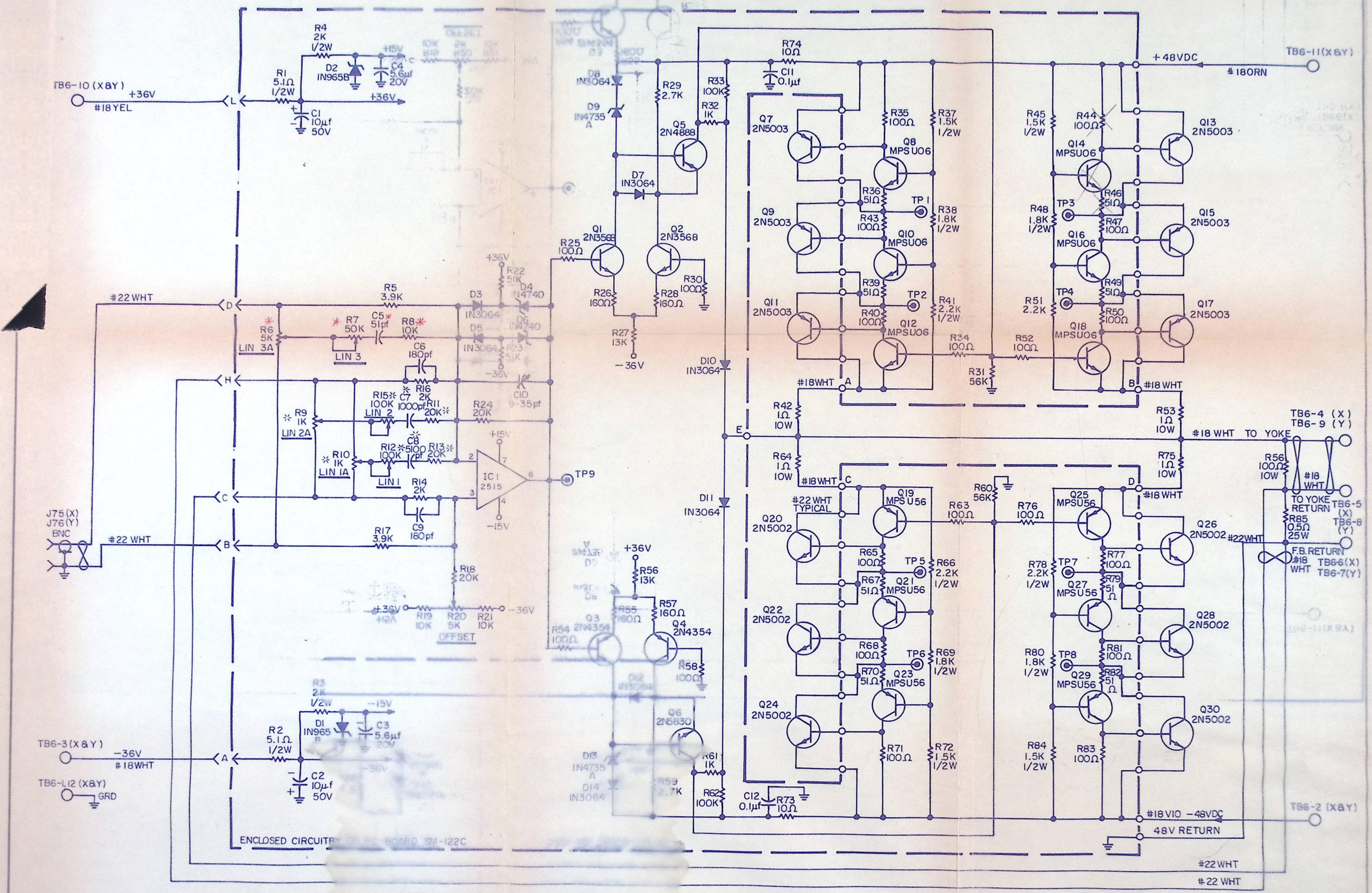
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE	REVISION	BY	DATE
	REV	R K P	7-6-73
DATE			
DR'N CK'D			
AP'VD			

TITLE
± 36 VOLT REGULATOR

SM-111A



HEAT SINK
ASTRODYNE -2404-4

LIN 1 T.C. 100-600 µS
LIN 1A AMP
2 T.C. 20-120 µS
2A AMP
3 T.C. 0.5-3 µS
3A AMP.

NOTE:
RESISTORS ARE 1/4W UNLESS OTHERWISE SPECIFIED.
✻ OMIT THESE COMPONENTS FOR CAESAR SYSTEM
TWO COMPLETE CIRCUITS REQUIRED FOR ONE X ANDY DEFLECTION UNIT

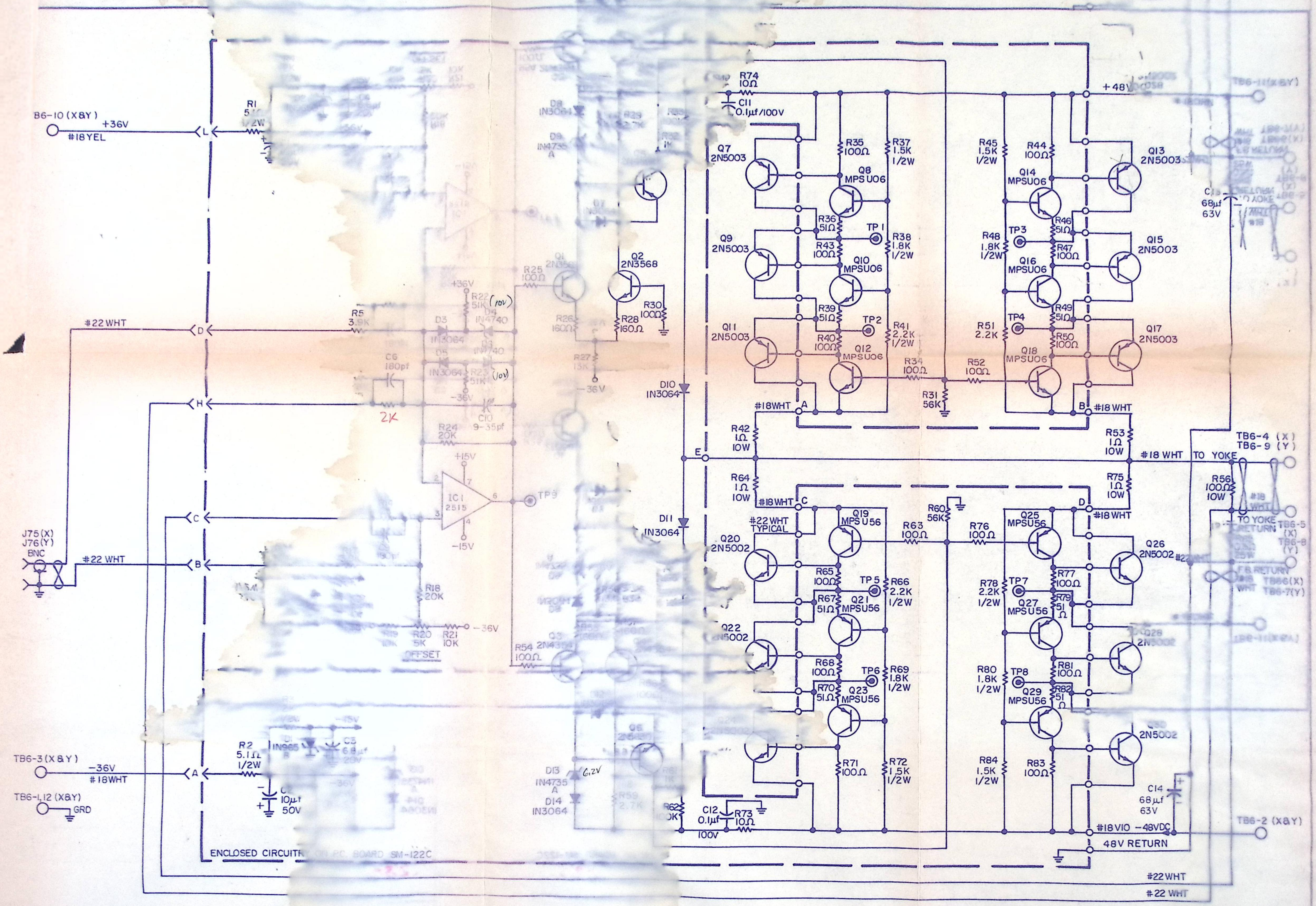
COMPUTER
IMAGE
CORPORATION

2475 W. 2ND. AVE.
DENVER, COLORADO 80223.

SCALE NONE	REVISION	BY	DATE
DATE 9-2-71			
DR'N. E.R. / CK'D.			
AP'VD.			

TITLE
MONITOR X OR Y DEFLECTION AMPLIFIER
SCHEMATIC

NO.
SM-122C



HEAT SINK
ASTRODYNE -2404-4

~~LIN 1 T.C.~~
~~LIN 1A AM~~
2
2A AMP
3
3A AMP

NOTE:
RESISTORS ARE 1/4W, UNLESS OTHERWISE SPECIFIED.
~~* OMIT THESE COMPONENTS [illegible] AESAR SYSTEM~~
TWO COMPLETE CIRCUITS REQUIRED FOR ONE X ANDY DEFLECTION UNIT

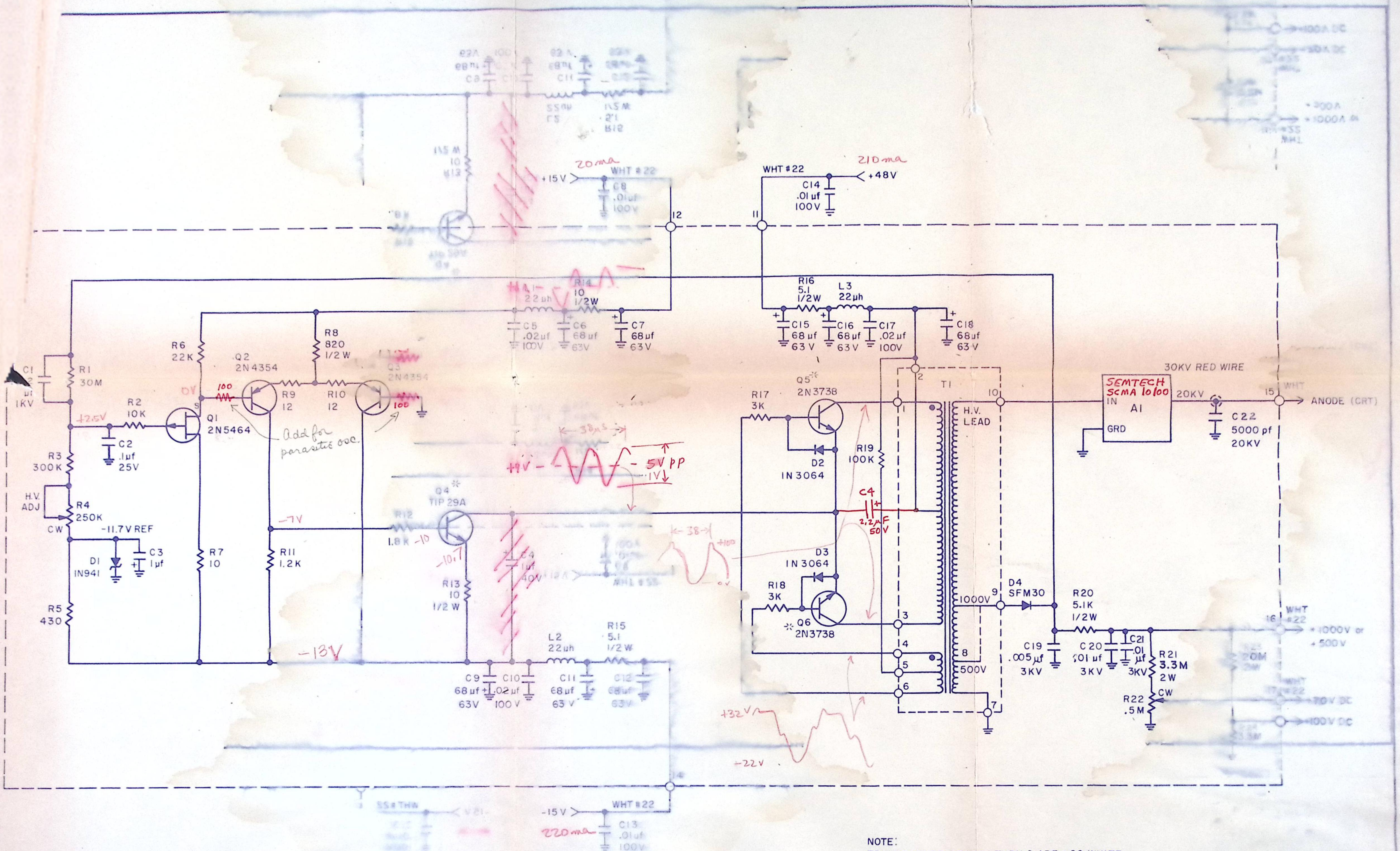
COMPUTER
IMAGE
CORPORATION

2475 W. 2ND. AVE.
DENVER, COLORADO 80223.

SCALE		REVISION	BY	DATE
NONE				
DATE 9-2-71				
DR'N. E. R.	CK'D.			
AP'VD.				

TITLE
MONITOR X OR Y DEFLECTION AMPLIFIER
SCHEMATIC

NO.
SM-122C-1



NOTE:
TRANSFORMER LEADS 1 THRU 6 ARE # 22 WHITE.
✲ Q4, Q5, Q6 ARE MOUNTED ON CHASSIS WITH MK-25 MOUNTING KIT.

ALL RESISTORS ± 5% 1/4 W UNLESS OTHERWISE SPECIFIED.

OBS.

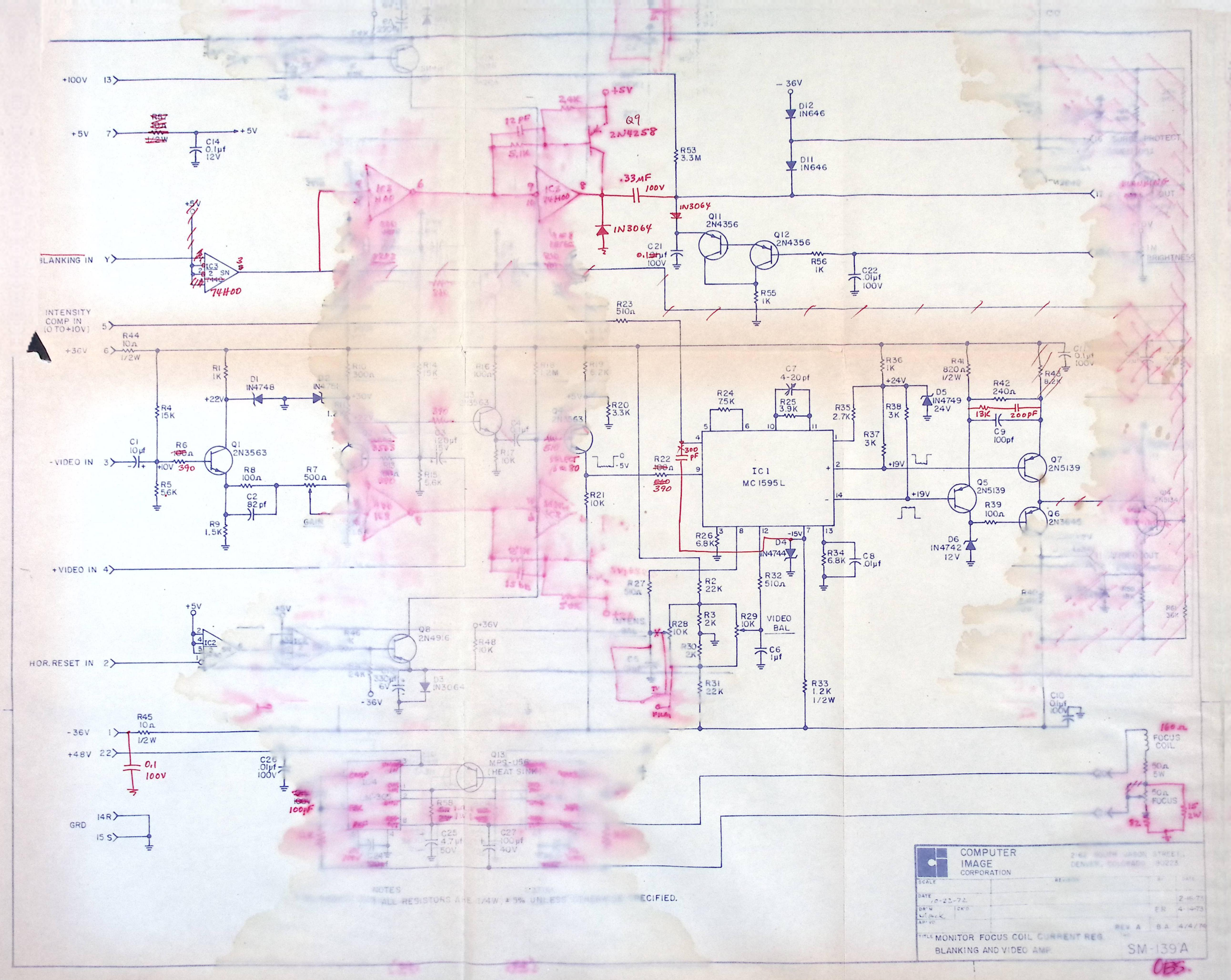
COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

SCALE		REVISION	BY	DATE
DATE				2-16-73
DR'N.	CK'D.			
AP'VD.				

TITLE
MONITOR HIGH VOLTAGE POWER SUPPLY
AND REGULATOR

NO.
SM-124



NOTES: ALL RESISTORS ARE 1/4W, ±5% UNLESS OTHERWISE SPECIFIED.

COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

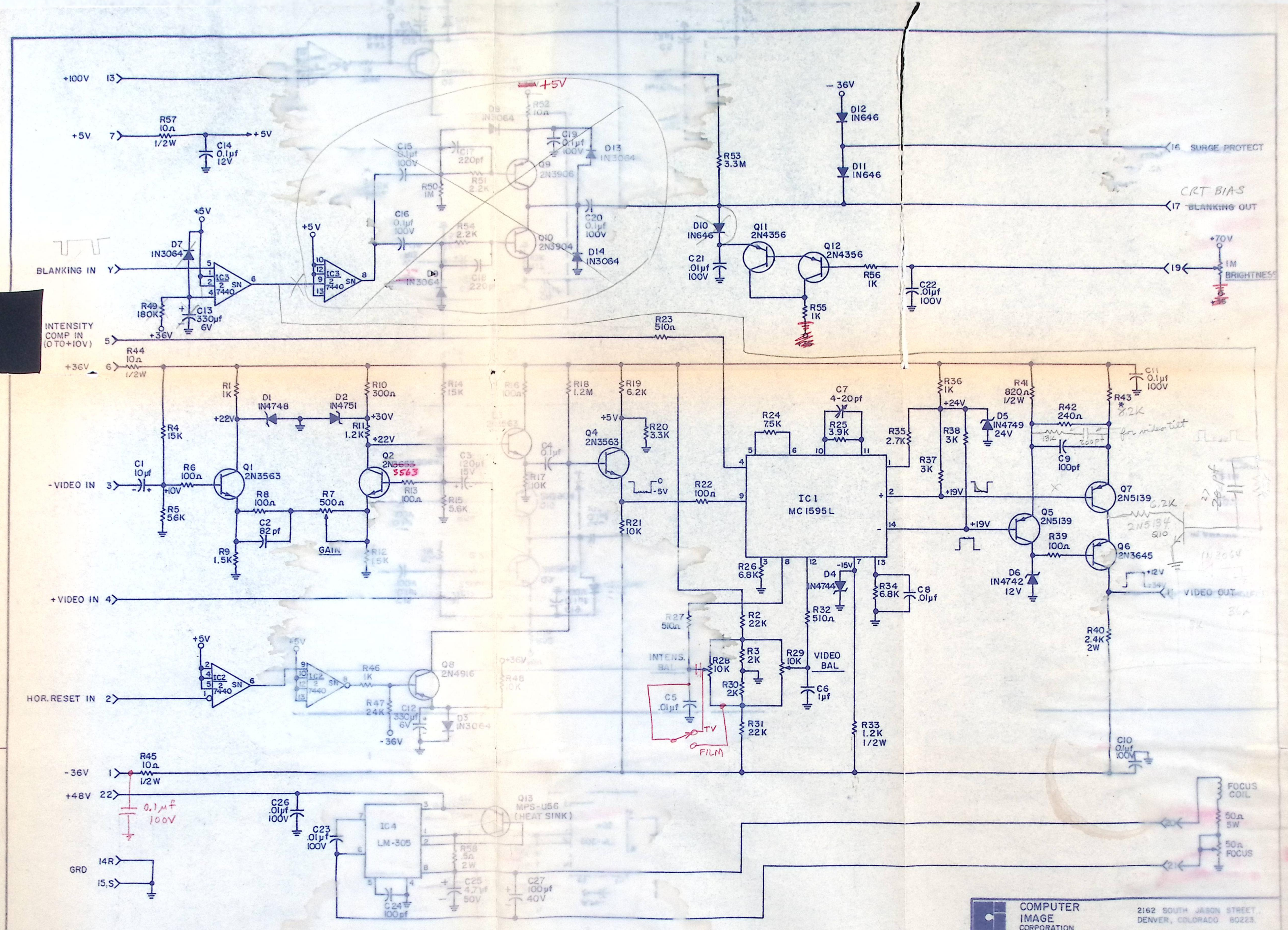
SCALE	REVISION	BY	DATE
DATE 10-23-72			2-16-73
DR'N Mack CK'D		ER	4-14-73
AP'VD	REV A	B.A	4/4/74

TITLE MONITOR FOCUS COIL CURRENT REG
BLANKING AND VIDEO AMP

SM-139A

OBS.

[redacted]



NOTES
1. ALL RESISTORS ARE 1/4W, ±5% UNLESS OTHERWISE SPECIFIED.
2. * THIS RESISTOR TO BE ADDED AS REQUIRED.

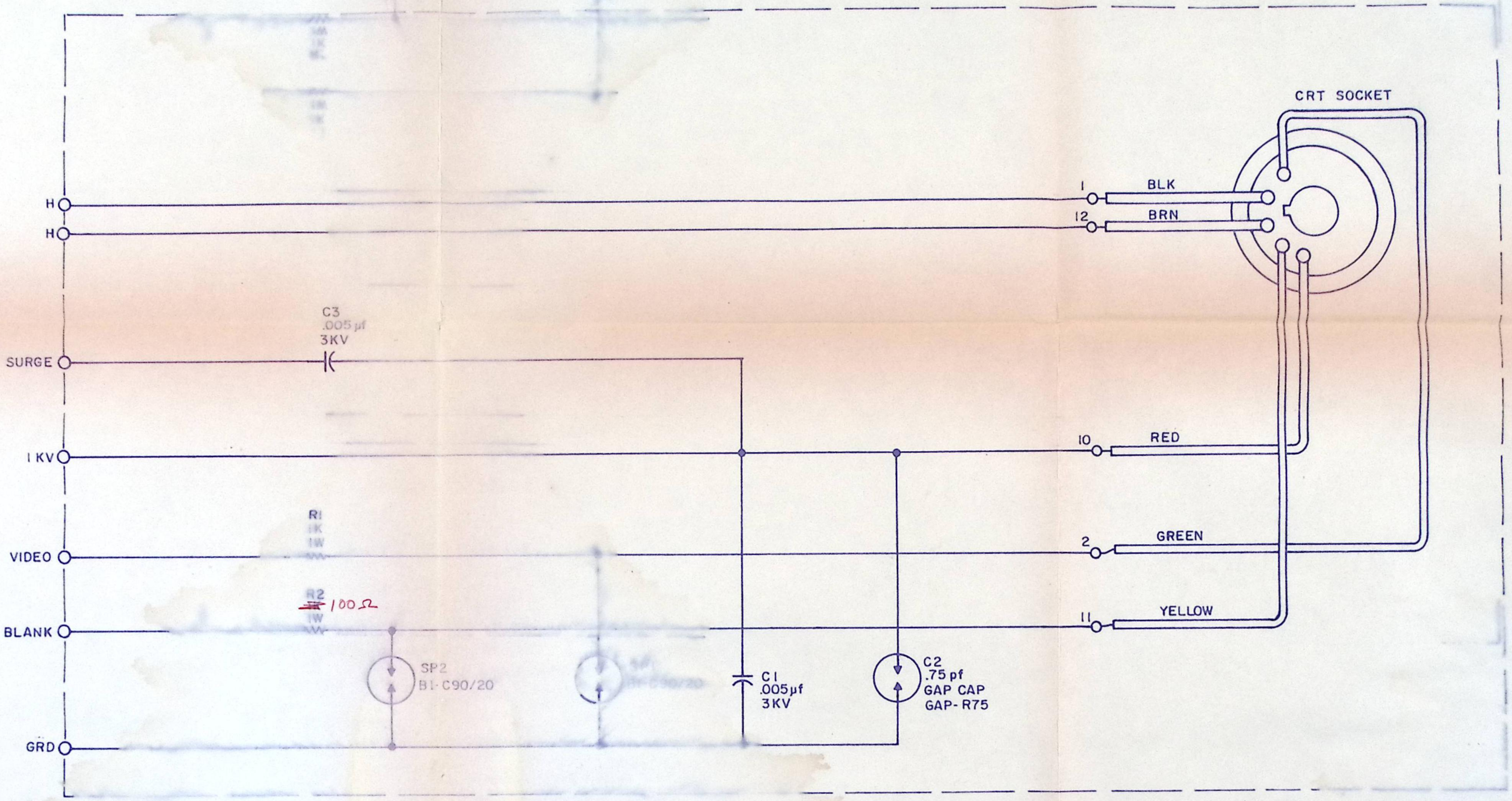
COMPUTER IMAGE CORPORATION
2162 SOUTH JASON STREET
DENVER, COLORADO 80223

SCALE	REVISION	BY	DATE
DATE 10-22-72			2-16-73
DR'N. Mack CK'D.		ER	4-14-73
AP'VD.			

TITLE MONITOR FOCUS COIL CURRENT REG. BLANKING AND VIDEO AMP.

NO. SM-139

OBS.



COMPUTER
IMAGE
CORPORATION

2162 SOUTH JASON STREET,
DENVER, COLORADO 80223

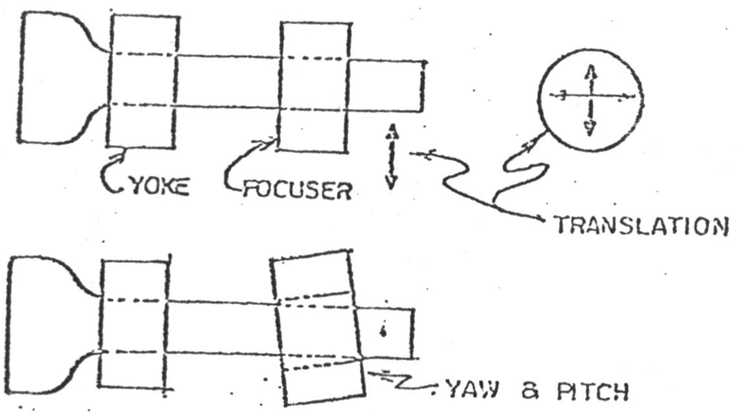
SCALE	REVISION	BY	DATE
DATE 10-21-72			
DR'N. Mack / CK'D.			
AP'VD.			

TITLE CRT SOCKET BOARD

NO. SM-143

OBS.

CRT YOKE AND FOCUSER ALIGNMENT



1. Position the yoke so that it just touches the flare of the CRT and its axis is coincident with the CRT axis.

2. Make the focus coil current zero by using the CRT Burn-in Shorting board SM-146-4 in place of the SM-139 (Video-Blanking-Focus) in the CRT unit.

3. Make the yoke current zero in both X and Y. This can be done by metering the yoke voltage and adjusting the CPU controls. Be sure to keep the brightness low to avoid phosphor burns.

4. Mark the spot position on the CRT face with crayon or tape.

5. Replace the SM-139 board, keep brightness low, and vary the focus knob over its entire range. Adjust the focuser yaw and pitch for minimum movement of the spot as the focus current is varied.

6. Adjust the focuser translation (perpendicular to the CRT axis) to locate the spot at the point previously marked.

7. Recheck spot movement in step 5 and readjust if necessary.

CRT PINCUSHION CORRECTION AND DEFLECTION AMPLIFIER OFFSETS ADJUSTMENTS

1. Adjust CPU controls to obtain full size raster inside window blanking.
2. Adjust TOP-BOTTOM pot on J3 of MVP (CVS-127) to make the top and bottom of the raster as straight as possible.
3. Reduce the Y deflection to zero, resulting in a line in the X direction. Position the line at the Y center of the CRT.
4. Adjust the Y offset pot on the Y Deflection Amplifier (SM-122), while recentering the line with the CPU control to make the line as straight as possible.
5. Repeat steps 1 thru 4 because of interaction.
6. With a full size raster, adjust LEFT-RIGHT pot on J3 of MVP (CVS-127) to make the left and right sides of the raster as straight as possible.
7. Reduce the X deflection to zero. Position the resulting line at the X center of the CRT.
8. Adjust the X offset pot on the X Deflection Amplifier (SM-122), while recentering the line with the CPU control to make the line as straight as possible.
9. Repeat steps 6 thru 8 because of interaction.
10. Repeat the entire procedure to overcome interactive effects.

MONITOR CRT

LINEARITY ADJUSTMENTS
(CVS-128 in MVP at J4 ~~and CVS-127 in MVP at J3)~~

1. Use the section control to split the raster into two equal sections.

2. Position the two raster sections so that the X axis bisects them and also so that they are on opposite sides of the monitor. Set CPU field switch to normal. Set Rotation for horizontal scan lines (0°).

3. Disconnect the monitor blanking (J6 on the back of the monitor) and then turn the monitor intensity up so that the raster sections again become visible.

4. Turn pots 1A, 2A and 3A for both channels fully counterclockwise.

5. Observe the distortion of the raster sections and adjust pots 1 and 1A and 2 and 2A of the X channel to minimize the distortion. Pots 1 and 1A mainly affect low frequency bending along the side of the raster sections; pots 2 and 2A, high frequency bending at the corners of the raster sections. Pots 1A and 2A affect the amplitude of correction. Pots 1 and 2 affect the time constants of the correction.

6. Throw the normal/90° switch on the CPU to the 90° position.

7. Repeat step 5 using the pots for the Y channel.

8. Turn the monitor intensity down and reconnect the blanking cable.

9. Patch a 1MHz digital signal into A17 on the Segment Blanking Controller. Set the start segment 2 thumbwheel switches to 900, the vertical segment switches to inhibit/ext. and the vertical segment 1-1 pot fully clockwise. The raster sections should look serrated.

10. Return the normal/90° switch to the normal position and arrange the raster sections so that one is directly above the other, they are the same length, and one section is swept horizontally from right to left while the other is swept from left to right.

11. Adjust pots 3 and 3A of the X channel so that the serrations line up throughout the raster sections.

12. Throw the normal/90° switch on the CPU to the 90° position.

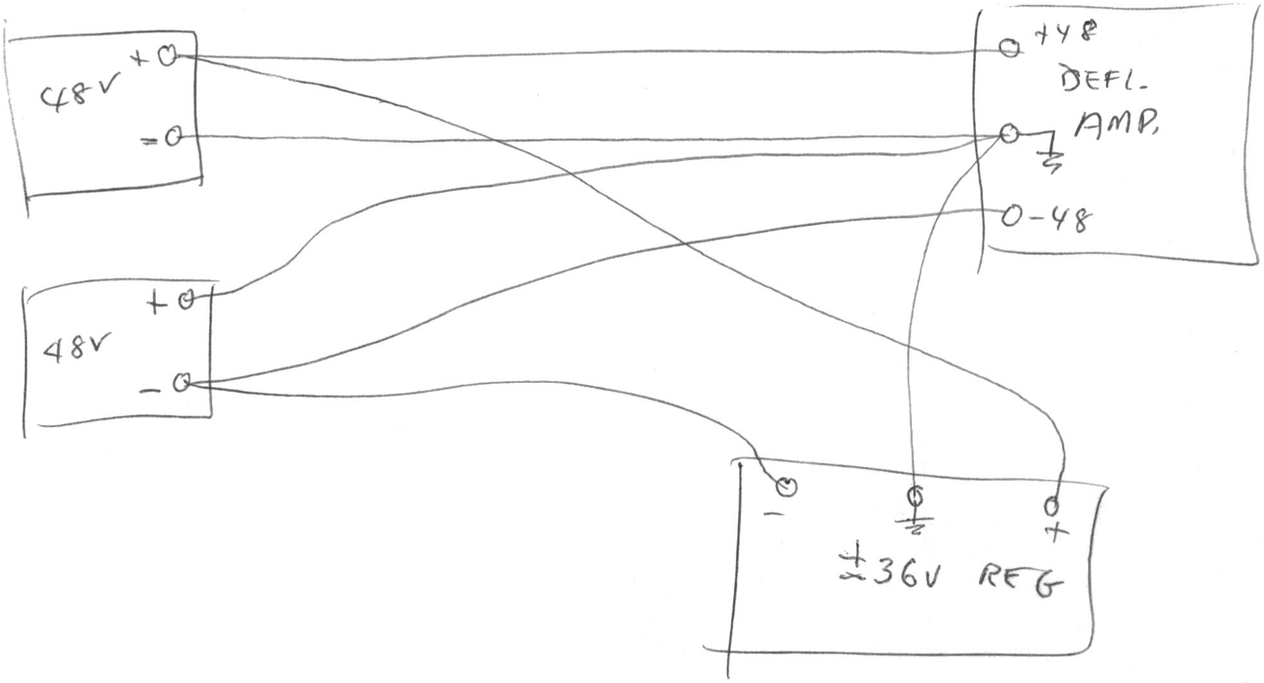
13. Repeat step 11 using the pots for the Y channel.

14. Disconnect the 1MHz blanking signal; throw the normal/90° switch to normal; reduce the Y size of the raster sections to 0; position the resulting two lines so that the vertical spacing between them is small and locate them just below the point where upper window blanking begins.

15. Adjust Y-pinc. peaking on CVS-~~127~~ 128 at ~~J3~~ J4 so that the two raster lines are parallel.

16. Move the display to a similar position near the bottom of the monitor CRT and check to see that the lines are still parallel. If they are not, adjust the Y-pinc. peaking so that the error is the same when the lines are at the top of the monitor CRT as when they are at the bottom.

17. Throw the normal/90° switch to the 90° position and repeat steps 15 and 16 using the X-pinc. peaking control and left and right positioning.



K +6.3
U ret

COMPUTER IMAGE MATERIAL LIST
MEMORY ADDRESS CARD - SCCS-100C
ROTATION CONTROLLER
SCANIMATE

Drawing No.	Description		No. Req'd.
	- CIRCUIT BOARD -		
SCCS-100C	SCCS-100C Memory Address Card Computer Image SCCS-100C		1
	- CAPACITORS -		
C1	100 ufd 25v M/E ET101X025A5	Elect	1
C2,3,4,5,6	.01 ufd 100v Sprague TG-S10	Cer	5
C7,8	470 pf 500v GI RDM15 FD471J03	Mica	2
	- INDUCTORS -		
L1	27 uh 10% Cambion 550-2950-30-2		1
	- INTEGRATED CIRCUITS -		
IC1,6	SN7400N TI		2
IC2	SN7410N TI		1
IC3,4,5	SN7401N TI		3
IC7,8,9,15,16	SN7475N TI		5
IC10,11	SN74193N TI		2
IC12,13,14,17, 18,19	SN74L85N		6
IC20,21	SN7404N TI		2
IC22,23	SN7430N TI		2

(cont.)

GROUND

TB 6-3 ±36V

TB 8-4,3 +6.3V → P4-U

TB 1-6,7 ±15V

TB 2-4,3 +5V → P1-DE
→ P2-DE

TB 3-6,5 -5V → P3-D
→ P4-A

TB 7 Chass Defl Amp

COMPUTER IMAGE MATERIAL LIST
X OR Y CHANNEL CARD - SM-101B (cont.)
CPU
SCANIMATE

Drawing No.	Description				No. Req'd.
	- RESISTORS -				
Resistors are fixed, composition ± 5% unless otherwise specified					
R1,43,81	30k ohm	1/4w			3
R2,3,35,82 111	20k ohm	1/4w			5
R4,31,32,36,37,84	20k ohm	1/8w	1%	Prec	6
R5,83	3.3k ohm	1/4w			2
R8,11,59,61,87,89	1k ohm	1/4w			6
R9,62,90	20k ohm Beckman 89PR20K	3/4w	10%	Var	3
R10,60,88	10k ohm Beckman 89PR10K	3/4w	10%	Var	3
R12,15,63,65,92,93	2k ohm	1/4w			6
R13,16,64,66,91,94	10k ohm	1/4w			6
R17,18,70,71,98,99	13.7k ohm	1/8w	1%	Prec	6
R19,67,95	1.2k ohm	1/8w	1%	Prec	3
R20,21,39,44,68,69, 96,97	15k ohm	1/4w			8
R22,23,72,73,100, 101	1.5k ohm	1/8w	1%	Prec	6
R24,25,26,74,75,76, 102,103,105	10k ohm	1/8w	1%	Prec	9
R27,77,106	8.66k ohm	1/8w	1%	Prec	3
R28,78,104	84.5k ohm	1/8w	1%	Prec	3
R33,38,48	330k ohm	1/4w			3
R40,45	2.7 ohm	1/4w			2
R41,42	39 ohm	1/4w			2

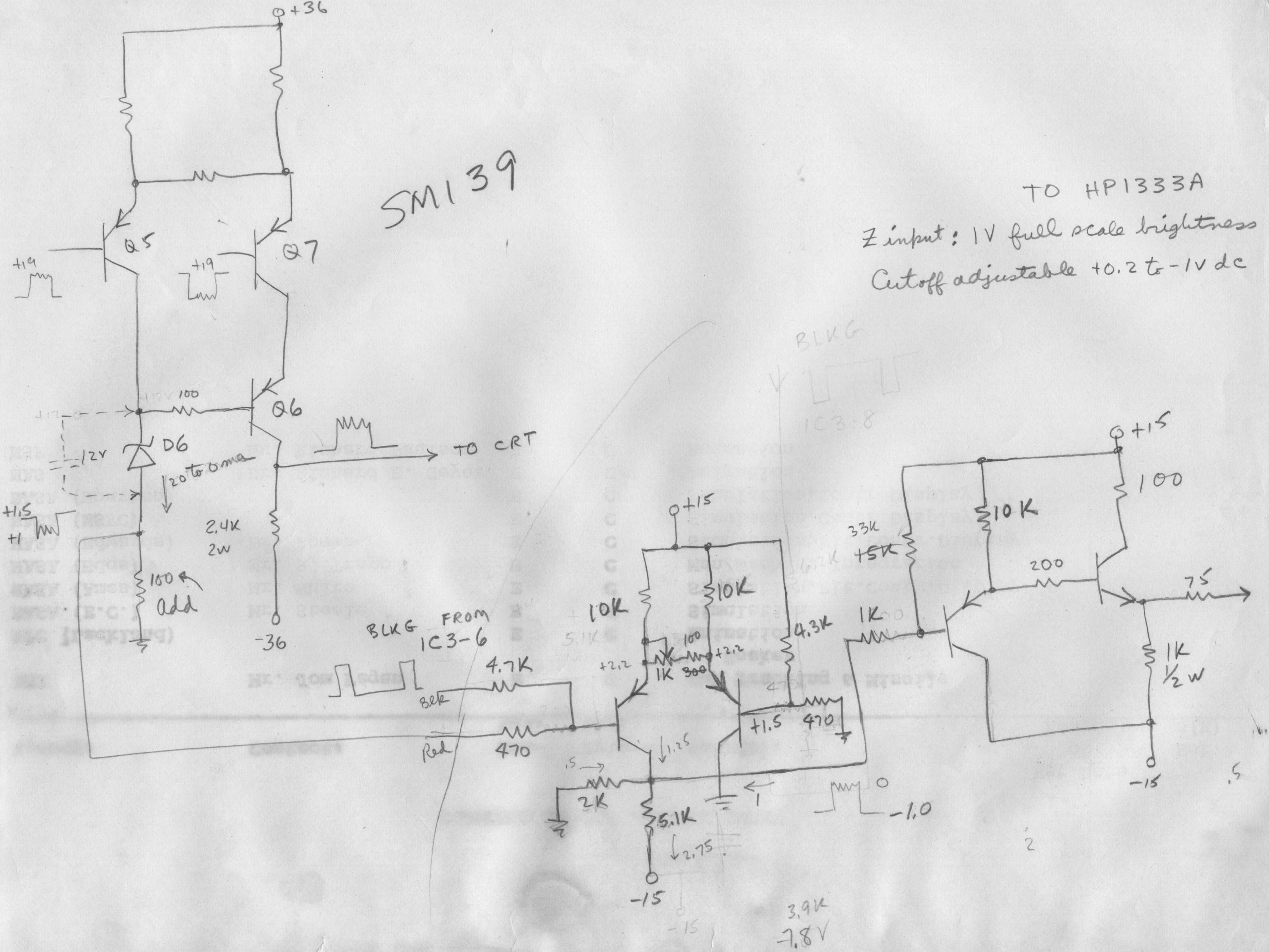
(cont.)

SM139

TO HP1333A

Z input: 1V full scale brightness

Cutoff adjustable +0.2 to -1V dc



CUSTOMER STATUS SUMMARY SHEET

Agency:	Contact:	Status:	Priority:	Task(s):	Est. Date of Award:	Est. $(K)
AMC	Mr. Jom Fagan	E	C	Gun Tracking & Missile Seaker		
ATC (Lackland)		E	C	Animation		
NASA. (E.C.)	Mr. Steele	E	C	Simulation		
NASA (Ames)	Mr. White	E	C	Simulation, Flt. Contr. Display		
NASA (Hdqs)	Mr. R. Trapp	E	C	Man/Machine Integration		
NASA (Edwards)	Dr. Roman	E	C	Simulation, Flt. Contr. Display		
NASA (MSFC)		E	C	Simulation, Contr Display		
NASA (Houston)		E	C	Simulation, Contr Display		
NAS	Dr. Richard E. Geyer	E	C	Animation		
NSF	Mr. Richard Paulson	E	C	Animation		

	Coax	pin	Power	pin		
			+5	7	Be	Video Out 11
66	Blanking	Y	+36	6	Y	
65	H Reset	2	-36	1	W	
69	Video	4	Gnd	14,15	Bk	
67	Intens Comp.	5				

SM-139 Socket + BNC'S for driving storage scope CRT grid

EVALUATION

The output equations for the two formats illustrate that both systems are capable of processing a maximum of 4 bus signals at any one time. The equations also show that their format uses the "NOT" terms rather extensively, while our format does not. Since, as noted, the presence of a "NOT" term signifies the loss of a bus, let's determine which outputs require the loss or disabling of 2 buses (eliminate those outputs with double "NOT" terms.)

$$\text{Output} = E+F+EF+(\overline{E}F+E\overline{F}+\overline{E}+\overline{F})(A+B+C+D+AB+CD)$$

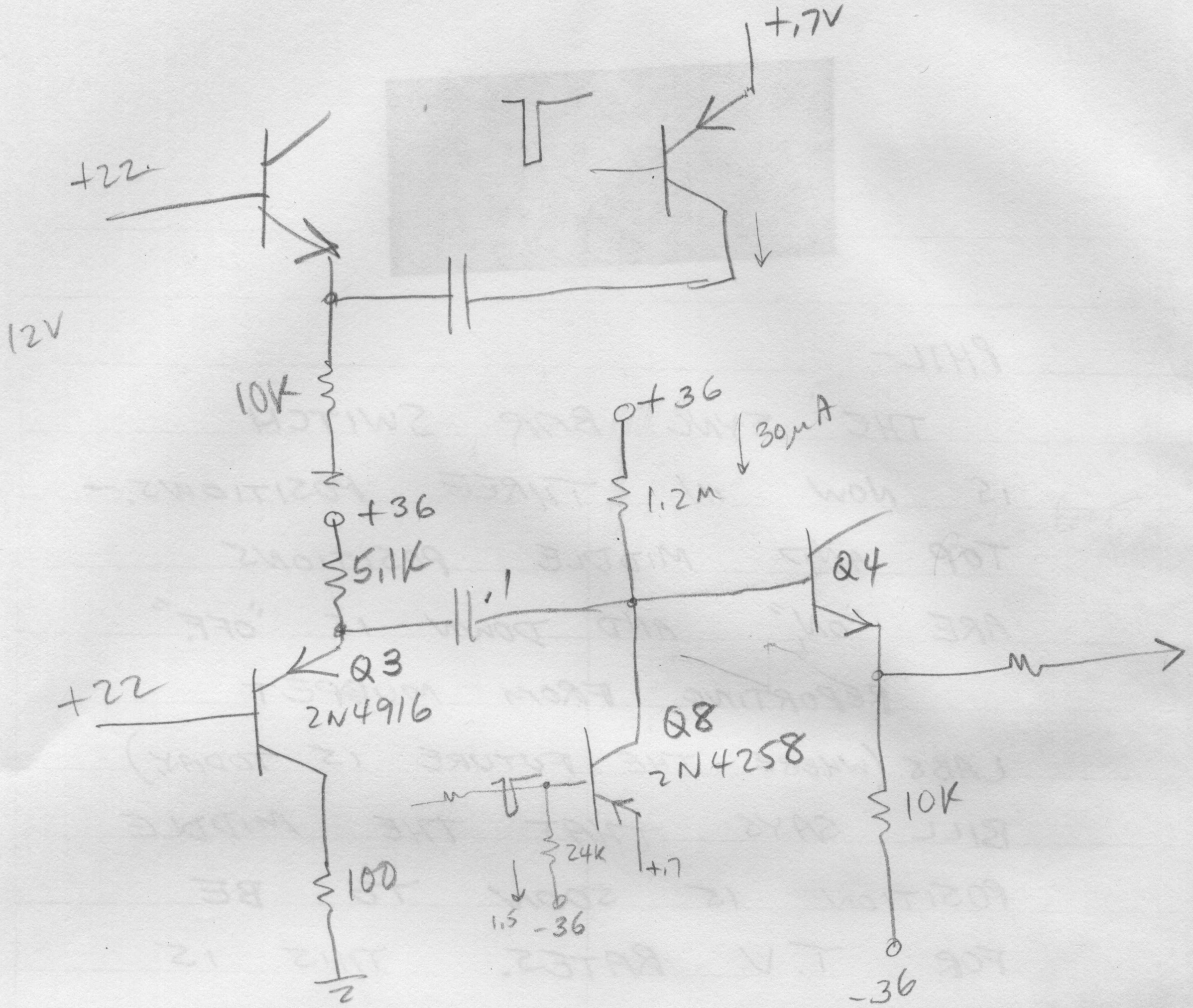
The significance of this remainder is that all 4 bus video combinations are missing, thus confirming the fact that their format must have 2 idle or disabled buses to accomodate 4 video signals at the output.

CONCLUSIONS

- Their format requires 6 or more M/E assigned buses to process 4 input signals at one time (2 idle buses.)
- Our format processes 4 input signals with only 4 M/E assigned buses (no idle buses)
- Equations for other bus combinations with their format show the following:

Max Outputs	Bus Req'ments	Idle Buses
2	2	0
3	4	1
5	8	3

- For the same capability our format will require a less complex control panel and should be less costly.
- The prospective switcher buyer should compare capability versus cost before placing an order!



+7V
+22
12V
10K
+36
30μA
1.2M
+36
5.1K
.1
Q4
Q3
2N4916
+22
Q8
2N4258
10K
24K
+7
1.5
-36
100
-36

SM-139

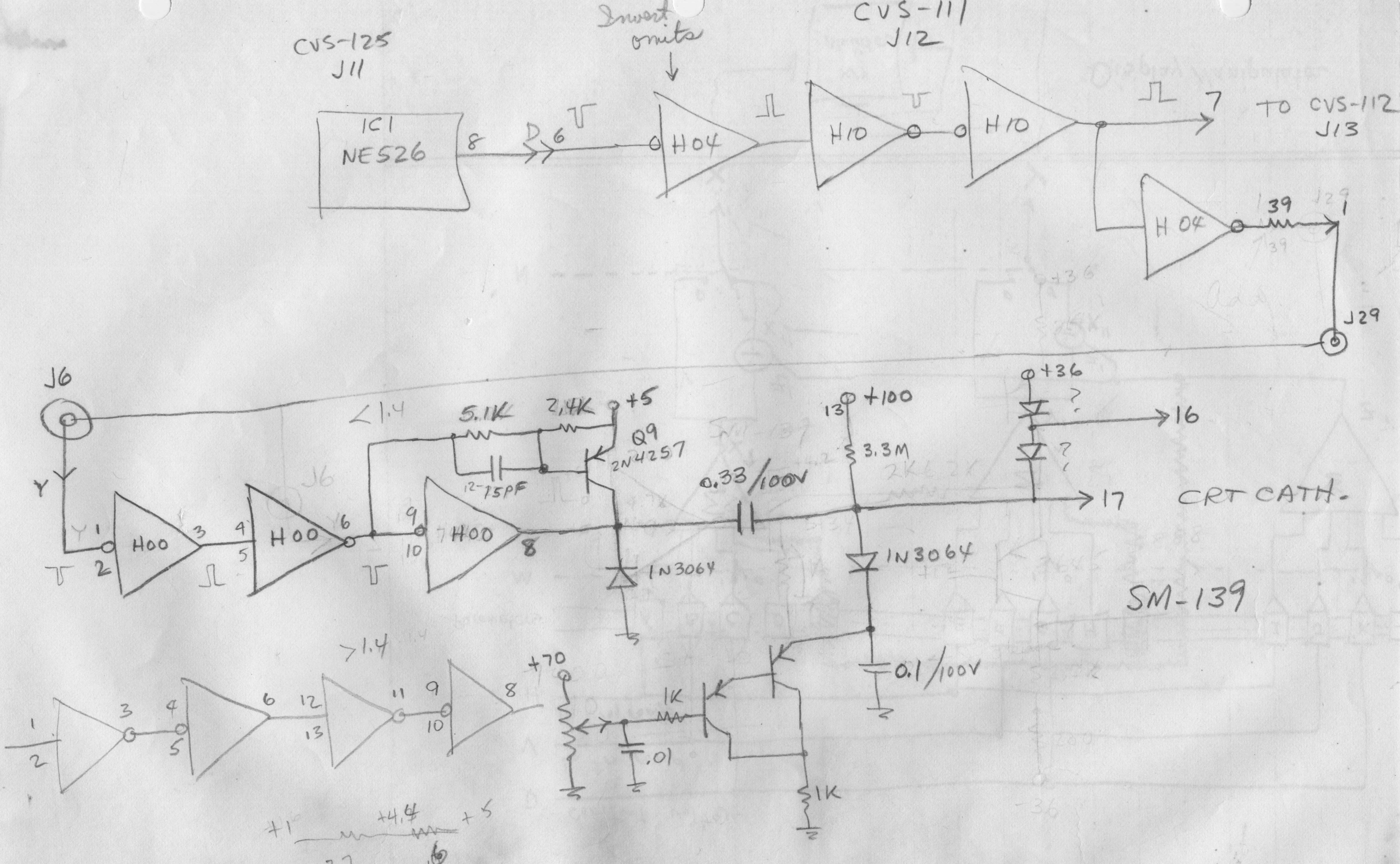
[redacted]

PHIL-

THE SYNC BAR SWITCH IS NOW IN THREE POSITIONS.- TOP AND MIDDLE POSITIONS ARE "ON," AND DOWN IS "OFF."

REPORTING FROM MUPPET LABS. (WHERE THE FUTURE IS TODAY.) BILL SAYS THAT THE MIDDLE POSITION IS SOON TO BE FOR T.V. RATES. THIS IS PART OF A GENERAL REDESIGN OF THE SYNC BOARD THAT WILL ALLOW FOR ALTERNATE FIELD AND FULL COLOR ANIMATION ON SCANIMATE. THIS IS TO BE FOLLOWED BY A PARTING OF THE RED SEA.

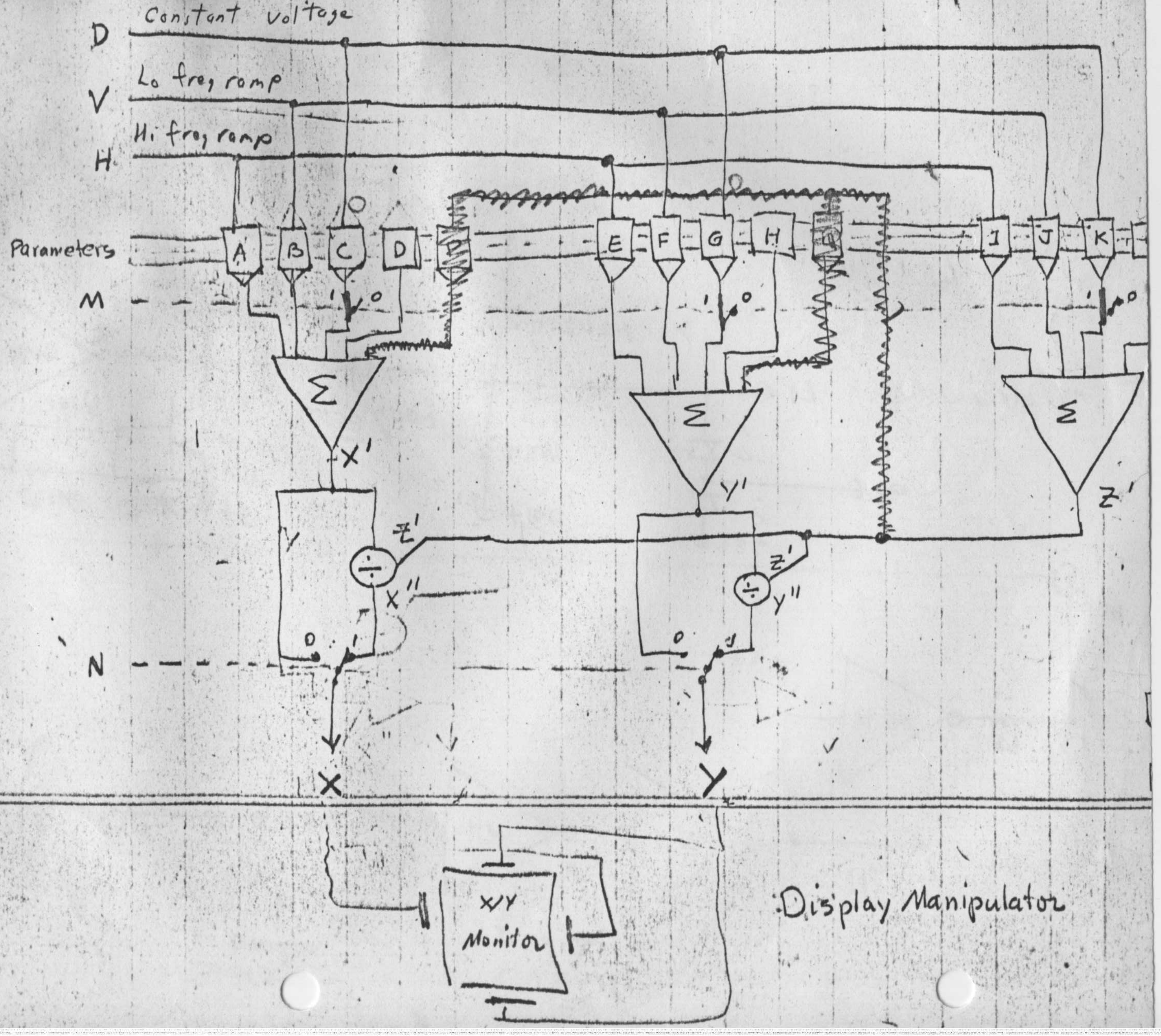
-DAVID



1,6-2,8

BLKG — SCANIMATE

Need 4 modes
optimize mo



Display Manipulator